CLAIMS:

1. A process for producing hollow, single-walled carbon nanotubes by catalytic decomposition of one or more gaseous carbon compounds comprising the steps of:

(1) forming a gas phase mixture of

(a) a carbon feed stock gas comprising one or more gaseous carbon compounds, each said compound having one to six carbon atoms and only H, O, N, S or C1 as hetero atoms, optionally admixed with hydrogen, and

(b) a gas phase metal containing compound which is unstable under reaction conditions for said decomposition, and which forms a metal containing catalyst which acts as a decomposition catalyst under reaction conditions;

(2) conducting said decomposition reaction under decomposition reaction conditions and thereby producing said nanotubes.

2. The method defined in claim 1, wherein 50% or more of said carbon feedstock gas is carbon monoxide.

3. The method defined in claim 1, wherein said carbon feedstock gas consists essentially of carbon monoxide.

4. The method defined in claim 1, wherein said decomposition reaction occurs at temperatures between approximately 400°C and approximately 1300°C.

5. The method defined in claim 1, wherein said decomposition reaction occurs at temperatures between approximately 700°C and approximately 1100°C.

6. The method defined in claim 1, wherein said decomposition reaction occurs at a pressure range of approaching 0 p.s.i.g. through approximately 100 p.s.i.g.

7. The method defined in claim 1, wherein said gas phase metal containing compound is produced by vaporizing a liquid or solid phase metal containing compound.

8. The method defined in claim 7, wherein said metal containing compound is vaporized into a flowing stream of carbon feedstock, wherein the temperature of said flowing stream is between approximately 400°C and approximately 1300°C and wherein said flowing stream is at a pressure range of approaching 0 p.s.i.g. through approximately 100 p.s.i.g.

9. The method defined in claim 1, wherein said gas phase metal containing compound is mixed with said feedstock by direct injection.

10. The method defined in claim 1, wherein said gas phase metal containing compound is in the form of an aerosol.

11. The method defined in claim 1, wherein said gas phase metal containing compound is $Mo(CO)_6$.

12. The method defined in claim 1, wherein said gas phase metal containing compound is $Co_2(CO)_8$.

13. The method defined in claim 1, wherein said gas phase metal containing compound is a volatile iron compound.

14. The method of claim 13, wherein said volatile iron compound is ferocene.

15. The method defined in claim 1, wherein said gas phase metal containing compound is a volatile manganese compound.

16. The method of claim 15, wherein said volatile manganese compound is methylcyclopentadienyl manganese tricarbonyl.

17. The method defined in claim 1, wherein said gas phase metal containing compound is a volatile cobalt compound.

18. The method of claim 17, wherein said volatile cobalt compound is cyclopentadienyl cobalt dicarbonyl.

19. The method defined in claim 1, wherein said gas phase metal containing compound is a volatile nickel compound.

20. The method of claim 19, wherein said volatile nickel compound is nickel dimethylglyoxime.

21. The method defined in claim 1, wherein said gas phase metal containing compound is produced by subliming a solid phase metal containing compound.

22. The method defined in claim 1, wherein said gas phase metal containing compound is produced by vaporizing a liquid phase metal containing compound.

23. Single-walled carbon nanotubes produced by catalytic decomposition of one or more gaseous carbon compounds comprising the steps of:

(1) forming a gas phase mixture of

(a) a carbon feed stock gas comprising one or more gaseous carbon compounds, each having one to six carbon atoms and only H, O, N, S or C1 as hetero atoms, optionally admixed with hydrogen, and

(b) a gas phase metal containing compound which is unstable under reaction conditions for said decomposition, and which forms a metal containing catalyst which acts as a decomposition catalyst under reaction conditions;

(2) conducting said decomposition reaction under decomposition reaction conditions and thereby producing said nanotubes.